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Environmental Protection  
Agency

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## **National Priority Chemicals Trends Report (2000-2004)**

### **Section 4**

#### **Chemical Specific Trends Analyses for Priority Chemicals (2000–2004): Benzo(g,h,i)perylene (B(g,h,i)P)**

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## Benzo(g,h,i)perylene (B(g,h,i)P)

### Chemical Information:

**CAS Number** – 191–24–2

**Alternate Names** – 1,12–benzoperylene

**General Uses** – B(g,h,i)P is a polycyclic aromatic hydrocarbon (PAH) that occurs naturally in crude oils. It has no known commercial use or production. Emissions typically result from petroleum refining, coal tar distillation, and the incomplete combustion of organic matter.

**Potential Hazards** – Although some PAHs have caused tumors in laboratory animals, B(g,h,i)P has not been shown to be a cancer concern. This chemical was added to the TRI based on its ecotoxicity.

### Summary Analysis:

- **NATIONAL** – Between 2000 and 2002, the quantity of B(g,h,i)P decreased by approximately 1.7 million pounds – an 85 percent decrease. However, the quantity has been steadily increasing since 2002; in 2004 approximately 374,000 pounds were reported.
- **REGIONAL** – In 2004, approximately 88 percent of B(g,h,i)P was reported by facilities in Regions 3, 4, and 6.
- **STATES** – Facilities in 46 states reported a quantity of B(g,h,i)P in 2004; 12 of these states reported approximately 95 percent of the total quantity. Tennessee facilities, with approximately 54 percent of the total quantity of B(g,h,i)P, reported a decrease of 89 percent since 2000.
- **FACILITIES** – Of the 380 facilities that reported B(g,h,i)P in 2004, one facility accounted for 54 percent of the total quantity of this chemical.
- **INDUSTRY SECTOR** – Facilities in seven industry sectors reported approximately 95 percent of the B(g,h,i)P in 2004. Facilities in SIC 3624 (Carbon and graphite products) reported the highest quantities, accounting for approximately 58 percent of the total quantity, mostly sent to onsite energy recovery. Most of this industry sector's quantity of B(g,h,i)P was reported by one facility, located in Tennessee.
- **MANAGEMENT** – Energy recovery has been the primary method used for managing B(g,h,i)P, accounting for 68 percent of the total quantity in 2004.

### National Trends:

Exhibit 4.34 shows the number of facilities that reported B(g,h,i)P in 2000 to 2004 and the quantities of this PC that were managed via disposal, treatment, energy recovery, and recycling. B(g,h,i)P was only reported to TRI beginning in 2000. Between 2000 and 2002, the quantity of B(g,h,i)P decreased by approximately 1.8 million pounds – an 85 percent decrease. However, the quantity has been steadily increasing since 2002; in 2004 approximately 374,000 pounds were reported. Energy recovery has been the primary management method used for B(g,h,i)P, accounting for 68 percent of the total quantity in 2004. Although recycling of B(g,h,i)P decreased significantly in 2003, recycling increased by approximately 35 percent in 2004.

**Exhibit 4.34. National Management Methods for Benzo(g,h,i)perylene, 2000–2004**

Management Methods for B(g,h,i)P and Number of Facilities	2000	2001	2002	2003	2004	Percent Change (2000–2004)	Management Method -- Percent of Quantity of This PC (2004)
Number of Facilities	326	356	337	377	380	16.6%	-
Disposal Quantity (lbs.)	121,575	85,381	42,901	72,742	77,565	-36.2%	20.7%
Energy Recovery Quantity (lbs.)	1,841,028	798,706	210,133	171,364	255,560	-86.1%	68.2%
Treatment Quantity (lbs.) <sup>11</sup>	141,799	106,435	57,851	73,711	41,324	-70.9%	11.0%
Priority Chemical Quantity (lbs.)	2,104,401	990,522	310,885	317,817	374,449	-82.2%	100%
Recycling Quantity (lbs.)*	85,078	173,211	133,561	61,464	82,647	-2.9%	-
*Note: Waste minimization is the emphasis of this Report. As such, we primarily focus on quantities of PCs that are managed via onsite/offsite disposal, treatment, or energy recovery because we believe these PC quantities offer the greatest opportunities for waste minimization. Because recycled quantities of PCs are already directed to their best uses, they are considered separate and distinct from the quantities of PCs not recycled. Throughout this section, the recycled quantity is presented to provide some perspective regarding the quantity of this PC already recycled compared to the quantities that are managed via disposal, treatment, and energy recovery and thus potentially available for waste minimization.							

Exhibit 4.35 shows the number of facilities that reported B(g,h,i)P within various quantity ranges. Of the 380 facilities that reported B(g,h,i)P in 2004, one facility accounted for 54 percent of the total quantity of this chemical. Seven of the facilities accounted for 81 percent of the total PC quantity of B(g,h,i)P in 2004.

**Exhibit 4.35. Distribution of Quantities by Facilities Reporting Benzo(g,h,i)perylene, 2004**

B(g,h,i)P ( 374,449 pounds)		
Quantity Reported	Number of Facilities Reporting This Quantity (2004)	Percent of Total Quantity of This PC (2004)
Up to 10 pounds	236	0.1%
11 – 100 pounds	80	0.9%
101 – 1,000 pounds	40	3.3%
1,001 – 10,000 pounds	17	14.7%
10,001 – 100,000 pounds	6	27.2%
100,001 – 1 million pounds	1	53.9%
> 1 million pounds	0	0.0%

## EPA Regional Trends:

Exhibits 4.36 and 4.37 show the pounds of B(g,h,i)P facilities reported for each EPA region for 2000–2004. In 2004, approximately 88 percent of the B(g,h,i)P was reported by facilities in Regions 3, 4, and 6. Since 2000, the total quantity of B(g,h,i)P decreased by approximately 1.7 million pounds; 95 percent (1.6 million pounds) of this considerable decrease was reported by facilities in Region 4 – despite a 34 percent increase in 2004. Most of this increased quantity in Region 4 is attributed to an increase in the use of coal tar pitch (containing B(g,h,i)P) at a facility in Tennessee. In terms of quantity, facilities in Region 10 reported the second largest decrease, approximately 78,000 pounds, compared to quantities reported in 2000.

<sup>11</sup> Some facilities may have mistakenly reported on their TRI Form R the threshold quantity of B(g,h,i)P, contained in fuel oil, as a quantity released or as a quantity treated onsite. As such, over-reporting of quantities released to the environment or treated, for these chemicals, may mean that the PC quantity is likewise over-stated. It is important to note that TRI chemicals in fuels that are destroyed during the combustion process are not considered treated. TRI chemicals are only considered treated if they are part of a waste stream and are then managed as a waste. EPA has notified reporters of these potential problems. As facilities submit corrected TRI Form Rs to correct any such over-reporting of this chemical, the PC quantities may decrease in subsequent updates of this Report.

**Exhibit 4.36. Quantity of Benzo(g,h,i)perylene Reported by EPA Region, 2000–2004**

EPA Region	2000 (pounds)	2001 (pounds)	2002 (pounds)	2003 (pounds)	2004 (pounds)	Percent Change in Quantity (2000–2004)	Percent of Total Quantity of This PC (2004)
1	1,391	3,259	3,365	3,721	3,679	164.4%	1.0%
2	16,637	8,756	8,406	8,288	7,059	-57.6%	1.9%
3	54,521	46,336	22,704	56,117	58,824	7.9%	15.7%
4	1,866,110	812,551	73,984	162,868	218,198	-88.3%	58.3%
5	32,058	38,015	45,000	25,447	25,093	-21.7%	6.7%
6	47,466	58,143	111,258	53,431	54,070	13.9%	14.4%
7	1,565	1,570	1,241	1,196	998	-36.2%	0.3%
8	4,641	4,560	41,405	5,091	4,027	-13.2%	1.1%
9	103	83	214	254	817	696.2%	0.2%
10	79,911	17,251	3,307	1,404	1,683	-97.9%	0.4%
<b>Total</b>	<b>2,104,401</b>	<b>990,522</b>	<b>310,885</b>	<b>317,817</b>	<b>374,449</b>	<b>-82.2%</b>	<b>100.0%</b>

**Exhibit 4.37. Distribution of Facilities Reporting Benzo(g,h,i)perylene in 2004 and the Quantities of Benzo(g,h,i)perylene Reported in 2004, by EPA Region**

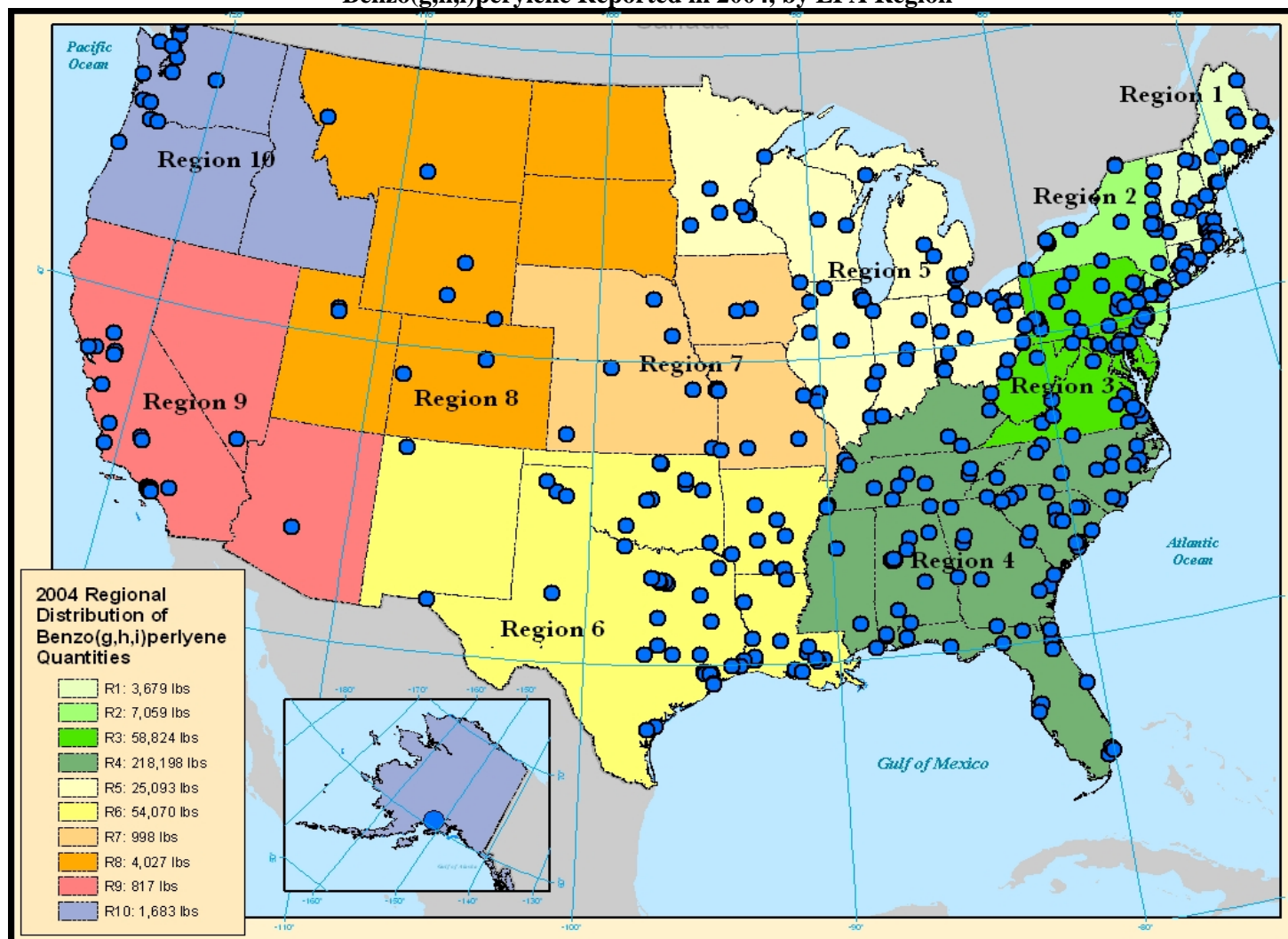


Exhibit 4.38 shows how B(g,h,i)P was managed by facilities within each EPA region in 2004. Approximately 67 percent of the PC quantity of B(g,h,i)P was managed using onsite energy recovery; facilities in Regions 4, 6, and 8 primarily used this method. Facilities in Regions 2 and 5 primarily used treatment, while facilities in Regions 3, 7, 9, and 10 sent most of their B(g,h,i)P quantities to land disposal. In 2004, facilities in Regions 3, 6, and 10 accounted for approximately 81 percent of the recycling of B(g,h,i)P.

**Exhibit 4.38. Management Methods for Benzo(g,h,i)perylene, by EPA Region, 2004**

EPA Region	Total Quantity of B(g,h,i)P (2004)	Percent of Total Quantity of B(g,h,i)P (2004)	Disposal		Energy Recovery		Treatment		Recycling	
			Onsite Disposal (pounds)	Offsite Disposal (pounds)	Onsite Energy Recovery (pounds)	Offsite Energy Recovery (pounds)	Onsite Treatment (pounds)	Offsite Treatment (pounds)	Onsite Recycling (pounds)	Offsite Recycling (pounds)
1	3,679	1.0%	160	81	1,841	0	1,597	0	0	2
2	7,059	1.9%	70	829	40	1	5,972	148	370	8
3	58,824	15.7%	0	54,272	1	39	4,291	220	7,668	7,928
4	218,198	58.3%	2,261	2,092	205,242	1,263	7,016	324	534	3,580
5	25,093	6.7%	206	8,825	185	3,183	12,580	115	10,772	27
6	54,070	14.4%	151	5,765	38,684	900	8,138	432	11,608	14,280
7	998	0.3%	197	423	0	52	281	46	20	7
8	4,027	1.1%	0	30	3,926	39	2	29	3	0
9	817	0.2%	13	558	54	109	0	84	0	260
10	1,683	0.4%	29	1,605	1	0	47	2	25,580	2

## State Trends:

Facilities in 46 states reported a quantity of B(g,h,i)P in 2004. Facilities in 12 of these states reported approximately 95 percent of the total national quantity (Exhibit 4.39).

Other trend highlights are:

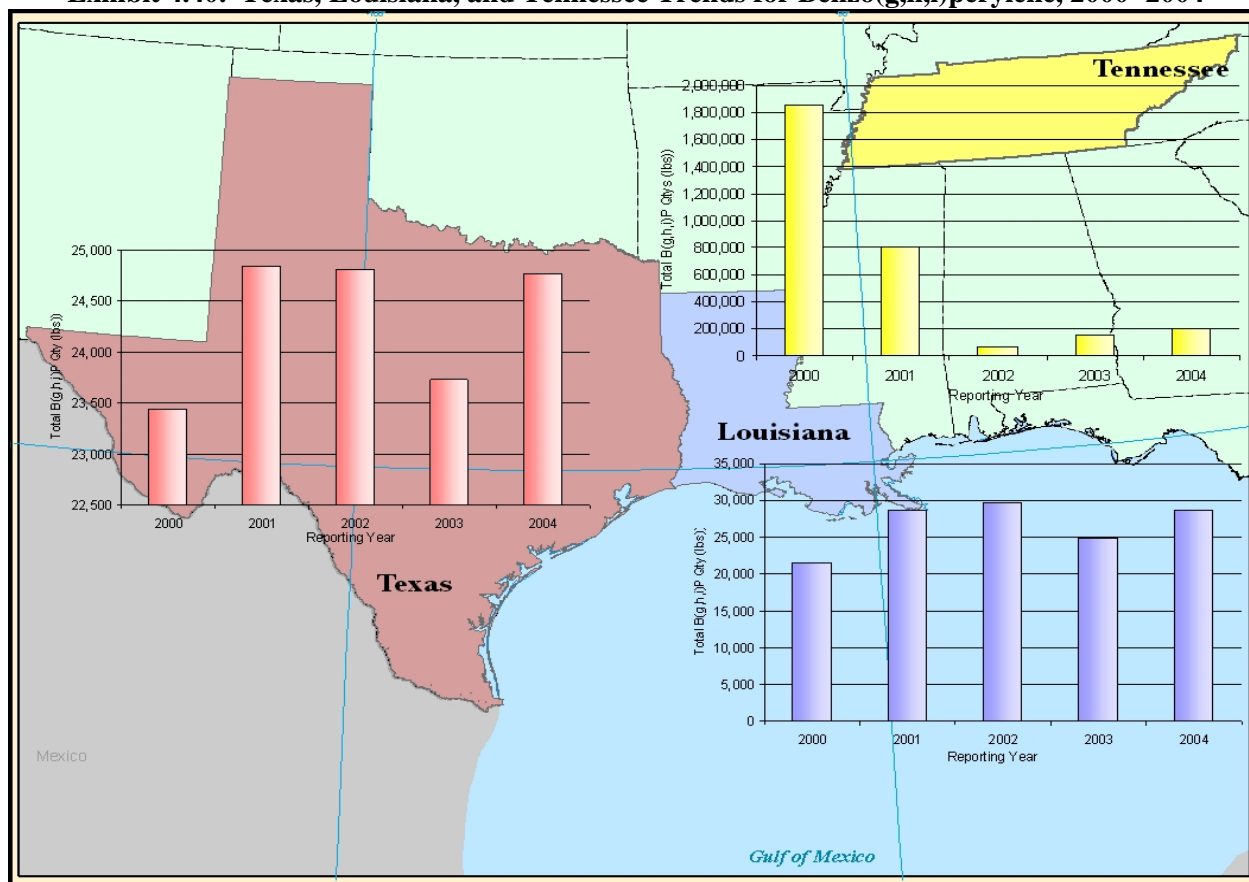
- Tennessee facilities, with approximately 54 percent of the total quantity of B(g,h,i)P, had a decrease of 89 percent since 2000, although the quantity of B(g,h,i)P increased from the 2003 quantity reported by facilities in Tennessee; the quantity of B(g,h,i)P also increased in facilities in West Virginia. Increased production at one facility in both Tennessee and West Virginia accounted for most of the increase.
- In Pennsylvania, the 2003 quantity of B(g,h,i)P more than tripled, but then was reduced by half in 2004. This increase and decrease was primarily due to quantities from the cleaning of tanks and off-spec product reported by one facility in 2003.
- Michigan facilities reported only a very small quantity of B(g,h,i)P for 2000–2002, but reported a dramatic increase of almost 10,000 pounds in 2003 and then a subsequent 30 percent decrease in 2004. These quantities resulted from the processing of residuals and tank cleanouts at a facility that is being shutdown.

**Exhibit 4.39. State Quantity Trends for Benzo(g,h,i)perylene, Based on Largest 2004 Quantity, 2000–2004**

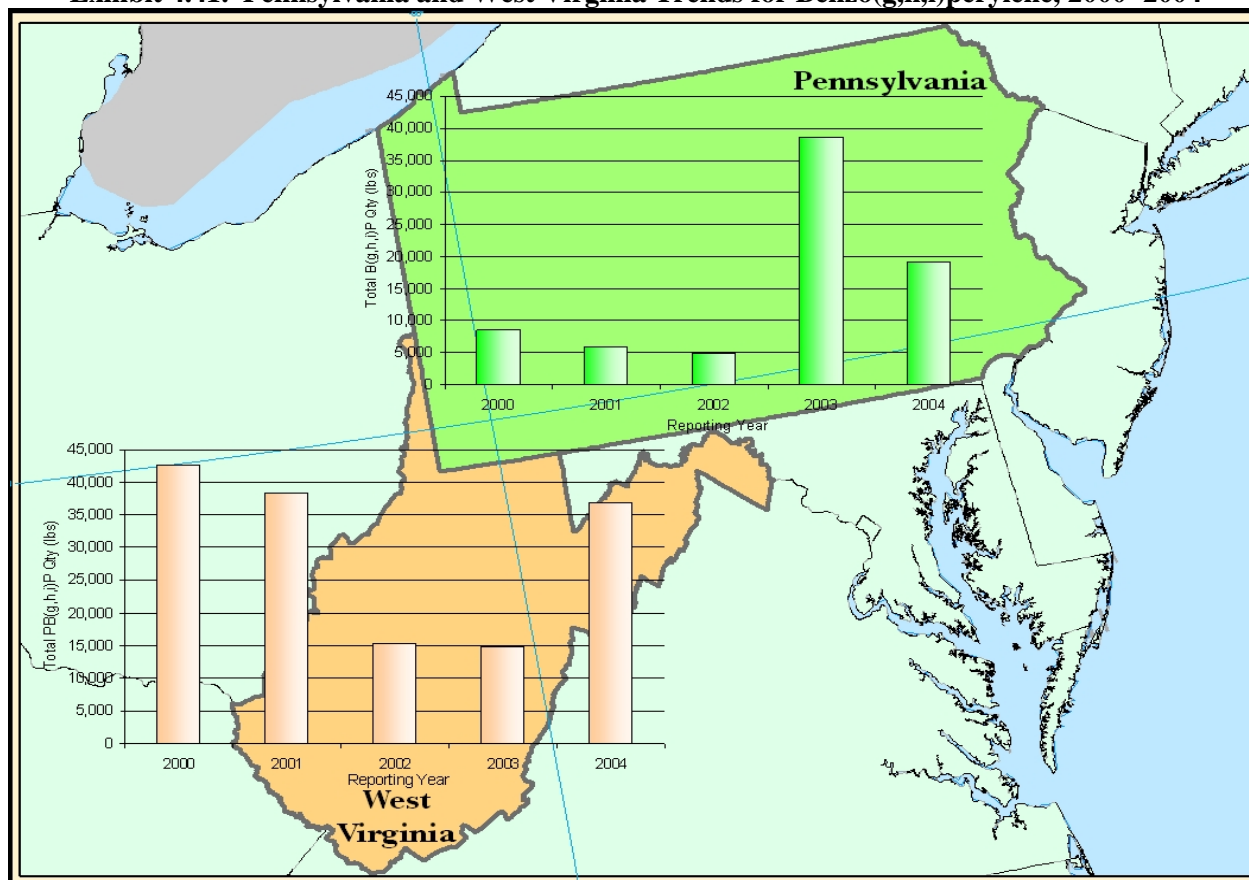
State	Total Quantity (pounds) of B(g,h,i)P					Change in Quantity (2000–2004)	Percent Change in Quantity (2000–2004)	Percent of Total Quantity of This PC (2004)
	2000	2001	2002	2003	2004			
TN	1,855,845	801,205	66,123	152,338	203,097	–1,652,748	–89.1%	54.2%
WV	42,586	38,266	15,285	14,691	36,968	–5,618	–13.2%	9.9%
LA	21,479	28,668	29,795	24,958	28,733	7,254	33.8%	7.7%
TX	23,444	24,847	24,820	23,732	24,771	1,328	5.7%	6.6%
PA	8,543	5,973	4,843	38,502	19,033	10,489	122.8%	5.1%
OH	26,536	35,729	38,231	12,036	12,902	–13,634	–51.4%	3.4%
MI	3	4	4	9,921	6,963	6,960	239998.3%	1.9%
NY	16,274	8,356	8,023	7,825	6,840	–9,434	–58.0%	1.8%
SC	3,653	4,484	3,934	2,914	5,084	1,431	39.2%	1.4%
IL	5,039	1,486	6,300	2,936	4,729	–310	–6.1%	1.3%
WY	4,603	4,537	41,254	4,988	3,937	–666	–14.5%	1.1%
FL	268	1,147	457	4,033	3,820	3,552	1322.9%	1.0%

Exhibits 4.40 and 4.41 show the trends for the quantity of B(g,h,i)P for the top five states in which facilities reported this PC in 2004.

**Exhibit 4.40. Texas, Louisiana, and Tennessee Trends for Benzo(g,h,i)perylene, 2000–2004**



**Exhibit 4.41. Pennsylvania and West Virginia Trends for Benzo(g,h,i)perylene, 2000–2004**



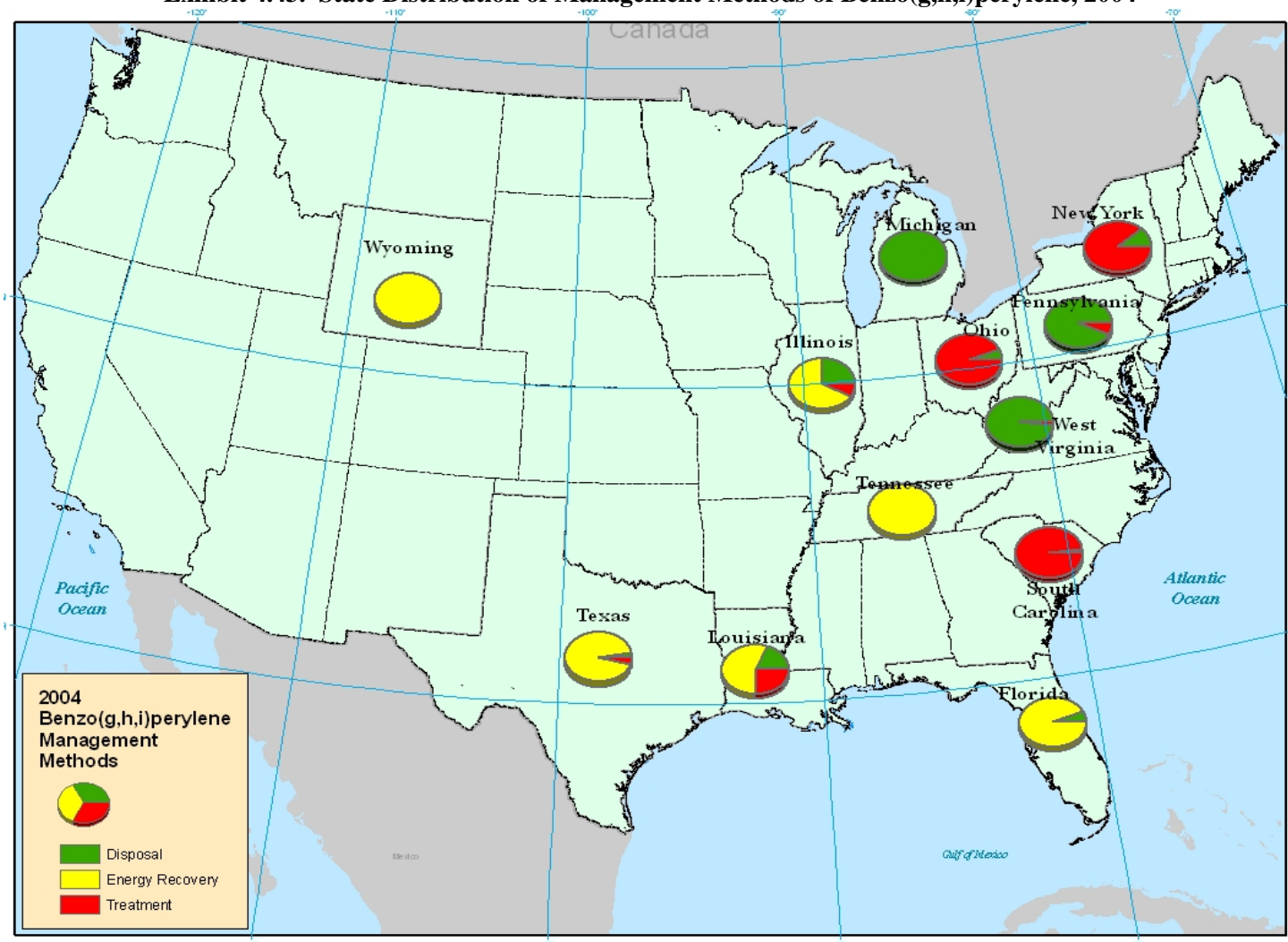
Exhibits 4.42 and 4.43 show how B(g,h,i)P was managed by facilities in the 12 states that accounted for 95 percent of the total B(g,h,i)P quantity in 2004. Energy recovery was the primary method for managing B(g,h,i)P in six of these 12 states. Most of the B(g,h,i)P was managed using onsite energy recovery, with one facility in Tennessee reporting approximately 81 percent of the total onsite energy recovery quantity. Offsite disposal was used primarily by facilities in West Virginia, Pennsylvania, and Michigan. In Ohio, New York, and South Carolina facilities, the B(g,h,i)P was mostly treated onsite. Approximately 94 percent of the recycling of B(g,h,i)P was reported by facilities in Pennsylvania, Louisiana, and Texas.

**Exhibit 4.42. State Management Methods for Benzo(g,h,i)perylene With Facilities Reporting 95 Percent of Total Quantity, 2004**

State	Total Quantity of B(g,h,i)P (2004)	Onsite Disposal (pounds)	Offsite Disposal (pounds)	Onsite Energy Recovery (pounds)	Offsite Energy Recovery (pounds)	Onsite Treatment (pounds)	Offsite Treatment (pounds)	Onsite Recycling (pounds)	Offsite Recycling (pounds)
TN	203,097	1,759	24	200,585	72	635	21	231	14
WV	36,968	0	36,316	1	12	429	210	0	0
LA	28,733	65	5,236	16,190	0	7,239	3	0	14,238
TX	24,771	11	471	22,494	781	652	363	11,598	16
PA	19,033	0	17,877	0	7	1,142	6	7,268	7,707
OH	12,902	0	747	6	5	12,135	9	9	14
MI	6,963	5	6,957	0	1	0	0	0	0
NY	6,840	1	744	40	0	5,909	146	370	4
SC	5,084	11	8	0	108	4,859	98	45	2
IL	4,729	200	1,000	0	3,176	350	3	2,124	11
WY	3,937	0	11	3,926	0	0	0	0	0
FL	3,820	151	75	3,591	3	0	0	0	14



**Exhibit 4.43. State Distribution of Management Methods of Benzo(g,h,i)perylene, 2004**



## Industry Sector (SIC) Trends:

Exhibit 4.44 shows the quantity of B(g,h,i)P for the seven industry sectors (SIC codes) where facilities reported approximately 95 percent of this chemical in 2004. Facilities in SIC 3624 (Carbon and graphite products) reported the highest quantities, accounting for approximately 58 percent of the total quantity of B(g,h,i)P reported in 2004. Most of this industry sector's quantity of B(g,h,i)P was reported by one facility, located in Tennessee. This facility has decreased their quantity of B(g,h,i)P by 46 percent since 2000, but reported an increase of approximately 67,000 pounds (+50 percent) in 2004. This increase was attributed to an increase in the use of coal tar pitch for producing carbon electrodes.

The increased quantity reported by facilities in SIC 2865 (Cyclic crudes and intermediates) was primarily due to an increase in production at a facility in West Virginia. For facilities in SIC 3312 (Blast furnaces and steel mills), the 2003 quantity of B(g,h,i)P increased dramatically in 2003, but then decreased by almost 50 percent in 2004. This increased quantity was due to the changing of SIC codes by a facility in Pennsylvania – from SIC 2865 to SIC 3312 in 2003.

Production wastes, as well as wastes generated from the cleaning of tanks and from off-spec product at this same facility accounted for most of the increased quantity for SIC 3312 facilities in 2003. This facility's change of SIC codes also is reflected in the decreased quantity for SIC 2865 facilities in 2003.

**Exhibit 4.44. Industry Sectors Reporting Benzo(g,h,i)perylene, 2000–2004**

Primary SIC	SIC Description	Number of Facilities That Reported B(g,h,i)P (2004)	2000 (pounds)	2001 (pounds)	2002 (pounds)	2003 (pounds)	2004 (pounds)	Change in Quantity (2000–2004)	Percent of Total Quantity of This PC (2004)
3624	Carbon and graphite products	10	1,881,345	824,537	77,738	165,116	217,954	-1,663,391	58.2%
2865	Cyclic crudes and intermediates	4	51,129	50,888	47,031	25,785	48,413	-2,717	12.9%
2895	Carbon black	18	40,665	37,294	42,333	43,745	45,697	5,032	12.2%
3312	Blast furnaces and steel mills	4	506	444	118	33,711	17,229	16,723	4.6%
3334	Primary aluminum	11	100,484	28,139	17,745	12,900	15,016	-85,468	4.0%
2911	Petroleum refining	50	11,152	14,012	101,897	12,900	7,631	-3,521	2.0%
2824	Organic fibers, noncellulosic	5	232	1,542	1,696	5,575	5,668	5,436	1.5%

Exhibit 4.45 shows how facilities managed B(g,h,i)P in the seven industry sectors that accounted for approximately 95 percent of the total quantity of this PC in 2004. Most of the B(g,h,i)P was sent to onsite energy recovery, especially within SIC 3624 (Carbon and graphite products) and SIC 2895 (Carbon black). Offsite disposal was primarily used for the B(g,h,i)P in SIC 3312 (Blast furnaces and steel mills) and SIC 2865 (Cyclic crudes and intermediates). Facilities in SIC 3334 (Primary aluminum) primarily used onsite treatment. Facilities in SICs 3334 (Primary aluminum) and 3312 (Blast furnaces and steel mills) reported approximately 88 percent of the recycling of B(g,h,i)P in 2004.

**Exhibit 4.45. Management Methods for Benzo(g,h,i)perylene in Industry Sectors With 95 Percent of Total Quantity, 2004**

Primary SIC	SIC Description	Total Quantity of B(g,h,i)P (2004)	Percent of Total Quantity (2004)	Disposal (pounds)		Energy Recovery (pounds)		Treatment (pounds)		Recycling (pounds)	
				Onsite Disposal	Offsite Disposal	Onsite Energy Recovery	Offsite Energy Recovery	Onsite Treatment	Offsite Treatment	Onsite Recycling	Offsite Recycling
3624	Carbon and graphite products	217,954	58.2%	1,759	1,463	200,586	5	14,102	39	592	0
2865	Cyclic crudes and intermediates	48,413	12.9%	0	45,189	0	2,743	270	211	366	3,525
2895	Carbon black	45,697	12.2%	59	99	38,691	0	6,825	23	0	0
3312	Blast furnaces and steel mills	17,229	4.6%	0	17,227	0	0	0	2	6,676	7,700
3334	Primary aluminum	15,016	4.0%	0	2,359	0	0	12,473	184	37,278	0
2911	Petroleum refining	7,631	2.0%	125	478	3,981	1,438	1,209	400	2,639	9
2824	Organic fibers, noncellulosic	5,668	1.5%	0	0	3,591	0	2,077	0	0	0